artdaq & OtSDAQ Introduction

"Linux at Fermilab" meeting
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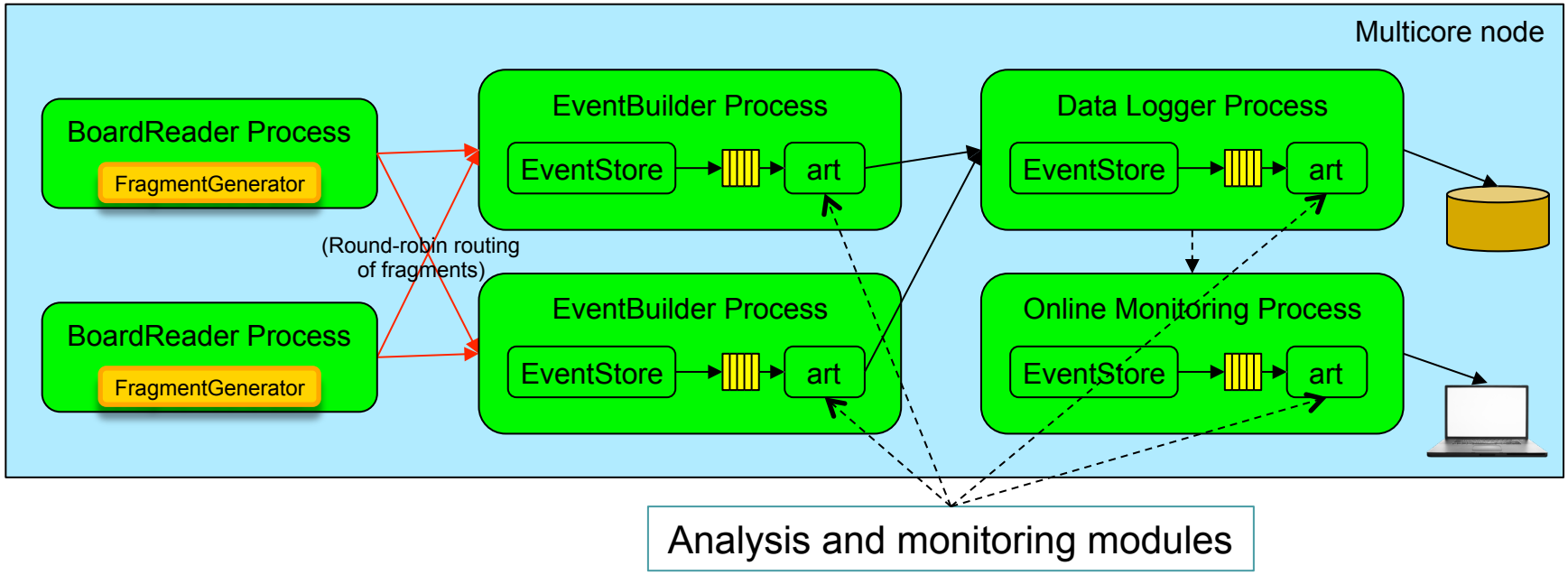
(On behalf of the SCD RSE Department)

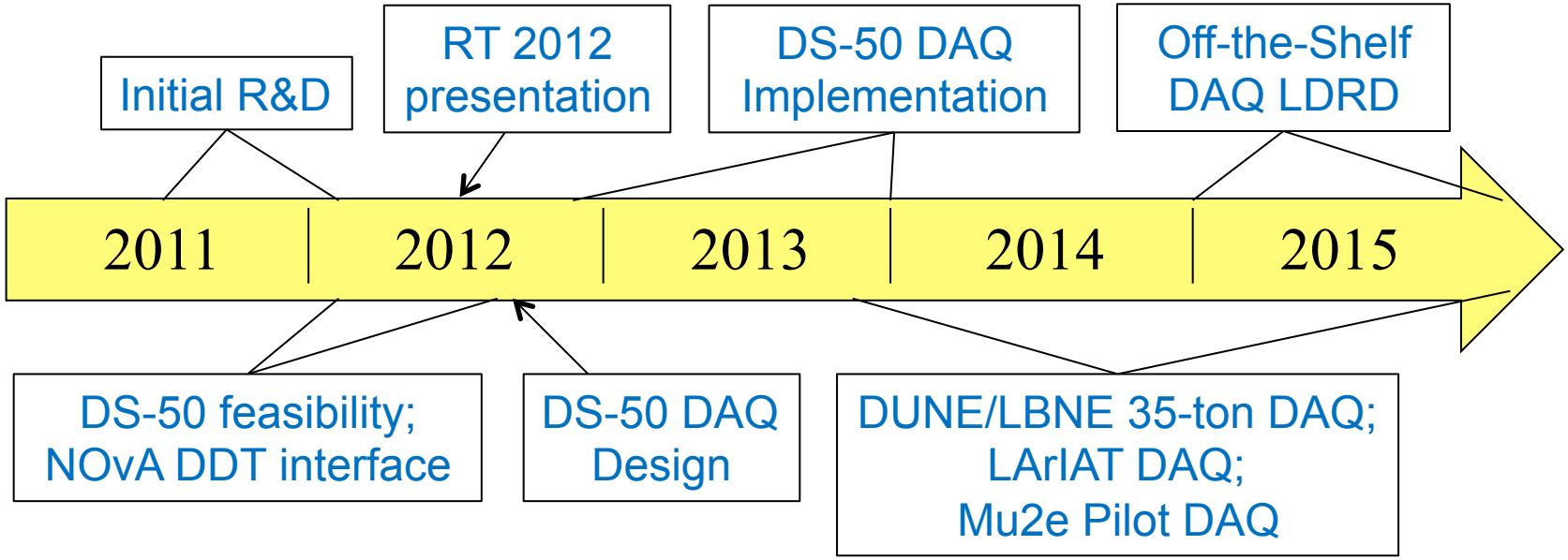
The *artdaq*-demo

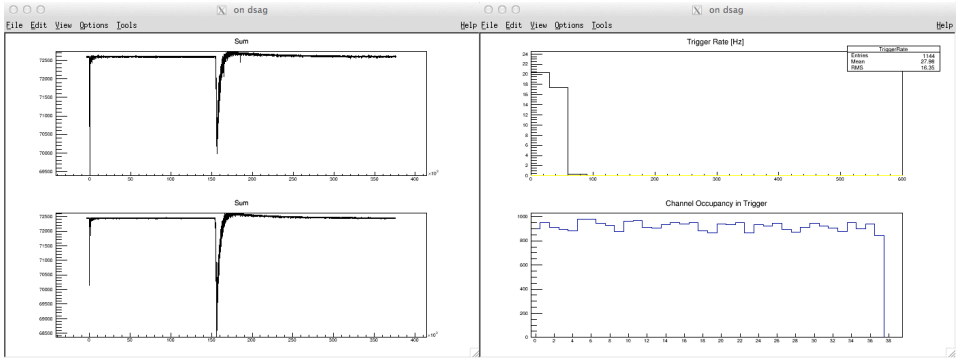
Demo package to illustrate *artdaq* use

- Instructions for downloading, building, and running a sample system
- More information here:
  - https://cdcvs.fnal.gov/redmine/projects/artdaq-demo/wiki
- An easy way to try out *artdaq* and learn more about it



artdaq Timeline





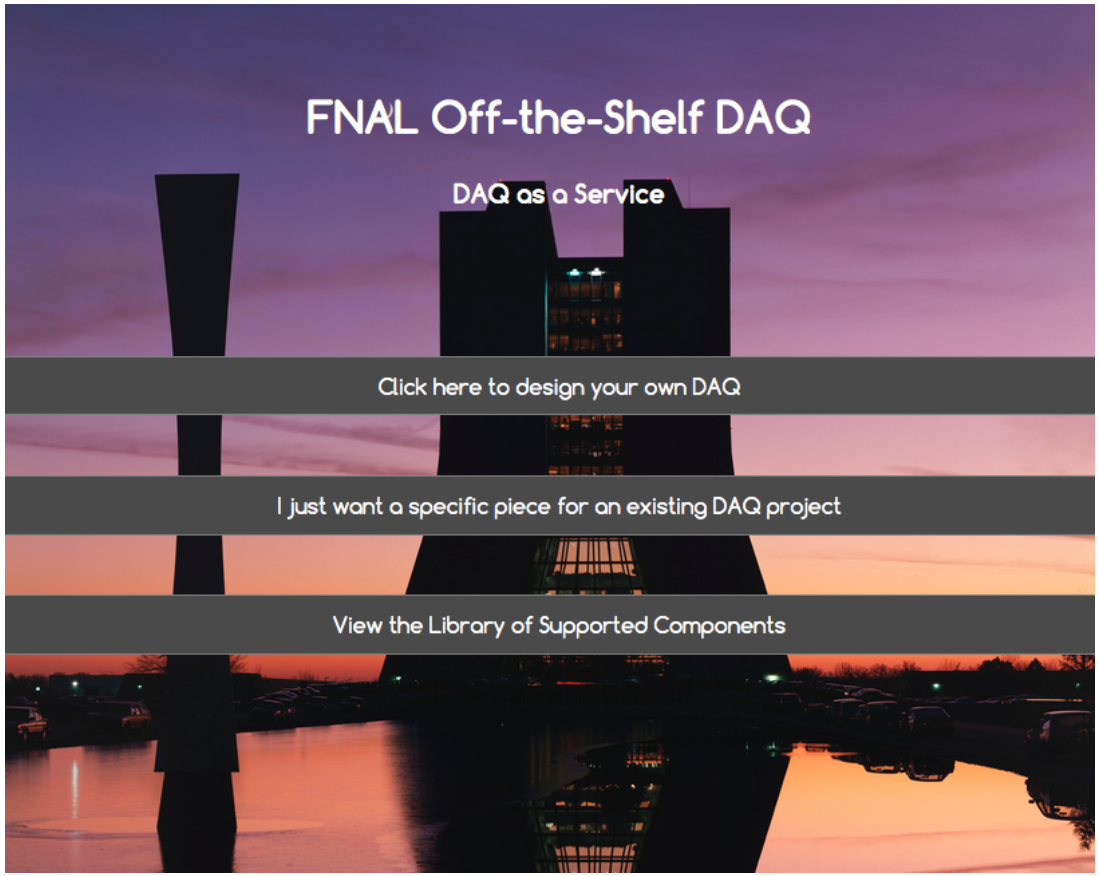
Sample DS-50 online monitoring histograms

Off-the-Shelf DAQ

LDRD to investigate the use of commercial (internet-of-things) hardware modules for common DAQ functions

Goal is to have

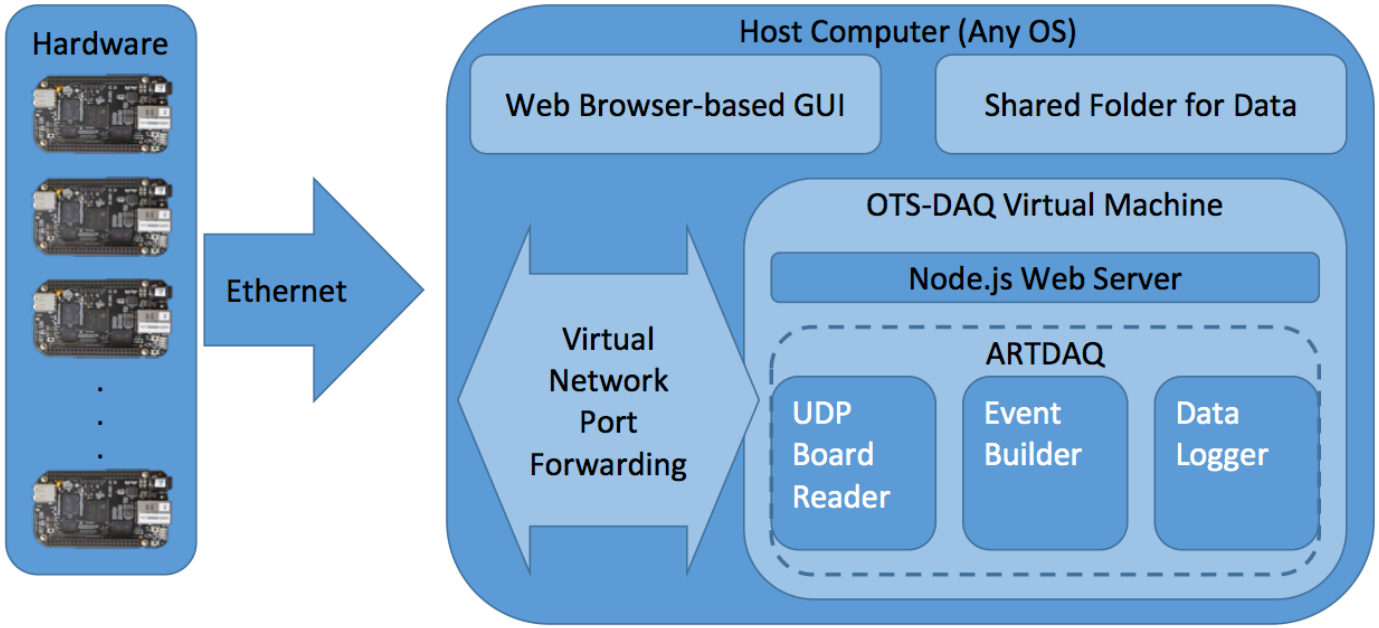
- Recommended HW
- Reusable firmware
- *artdaq* and *art* SW



First OtS DAQ Sample Integrated System

Sample “simple” system:

- BeagleBone Black hardware module(s)
- Windows PC
- *artdaq* software



People to Contact

People in RSE working on *artdaq*:

- John Freeman, Eric Flumerfelt, myself, Ron Rechenmacher

People in RSE working on OtS DAQ:

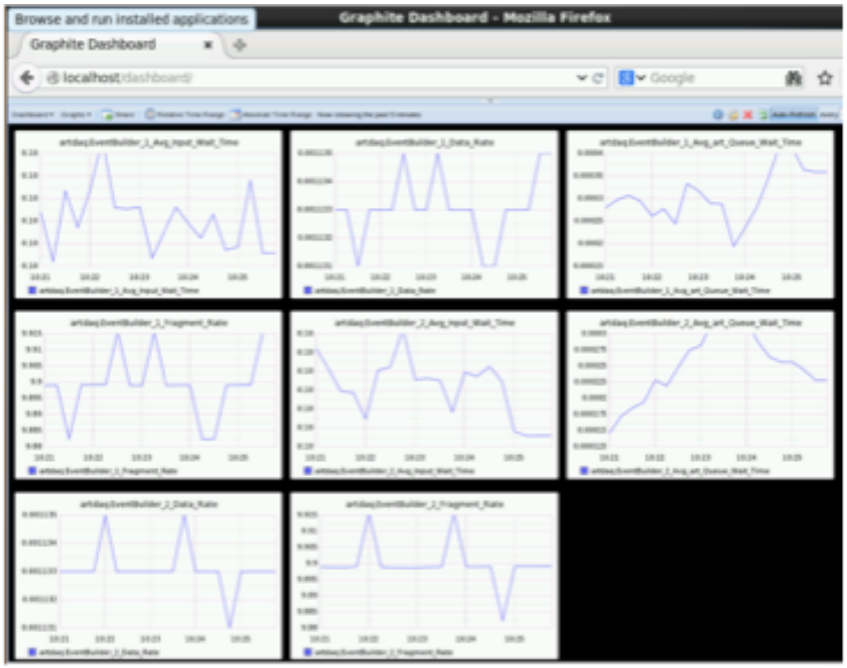
- Ryan Rivera, Mark Bowden, Alan Prosser, Lorenzo Uplegger, Greg Deuerling
- Eric Flumerfelt, Ron Rechenmacher

DAQ Monitoring

"metrics reporting" infrastructure implemented last fall.

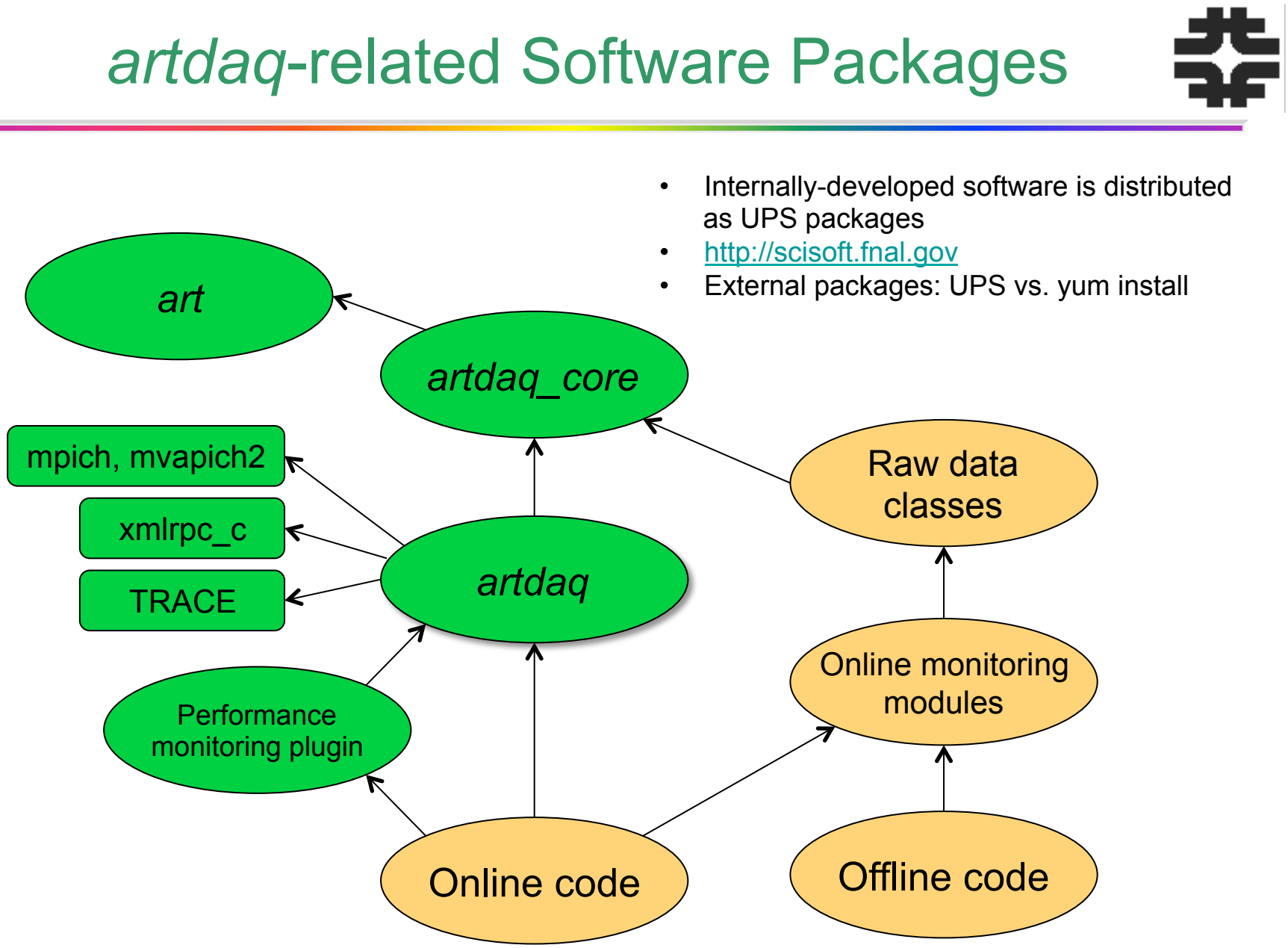
Ganglia reporting working now in the DUNE/LBNE 35t DAQ.

Sample Ganglia display



Sample Graphite display

artdaq-related Software Packages



- Internally-developed software is distributed as UPS packages
- http://scisoft.fnal.gov
- External packages: UPS vs. yum install

Possible Topics of Interest (1)

Eric Flumerfelt has successfully compiled most, if not all, of the *artdaq* software stack on SLF7. There have been no discussions that I know of for adding official SLF7 support to *artdaq* and *art*, though.

As we make case-by-case decisions on which third-party packages to distribute with UPS, it may be useful to discuss which products and versions are available as system installs.

- E.g. Ganglia

Some work has been done with Docker as a way to distribute a ready-to-use *artdaq* software environment. We've fallen back to just using a VirtualBox VM in our OtS DAQ work, though.

Possible Topics of Interest (2)

Production and teststand DAQ clusters are typically configured with a small number of gateway nodes and some number of private-network nodes for DAQ functions

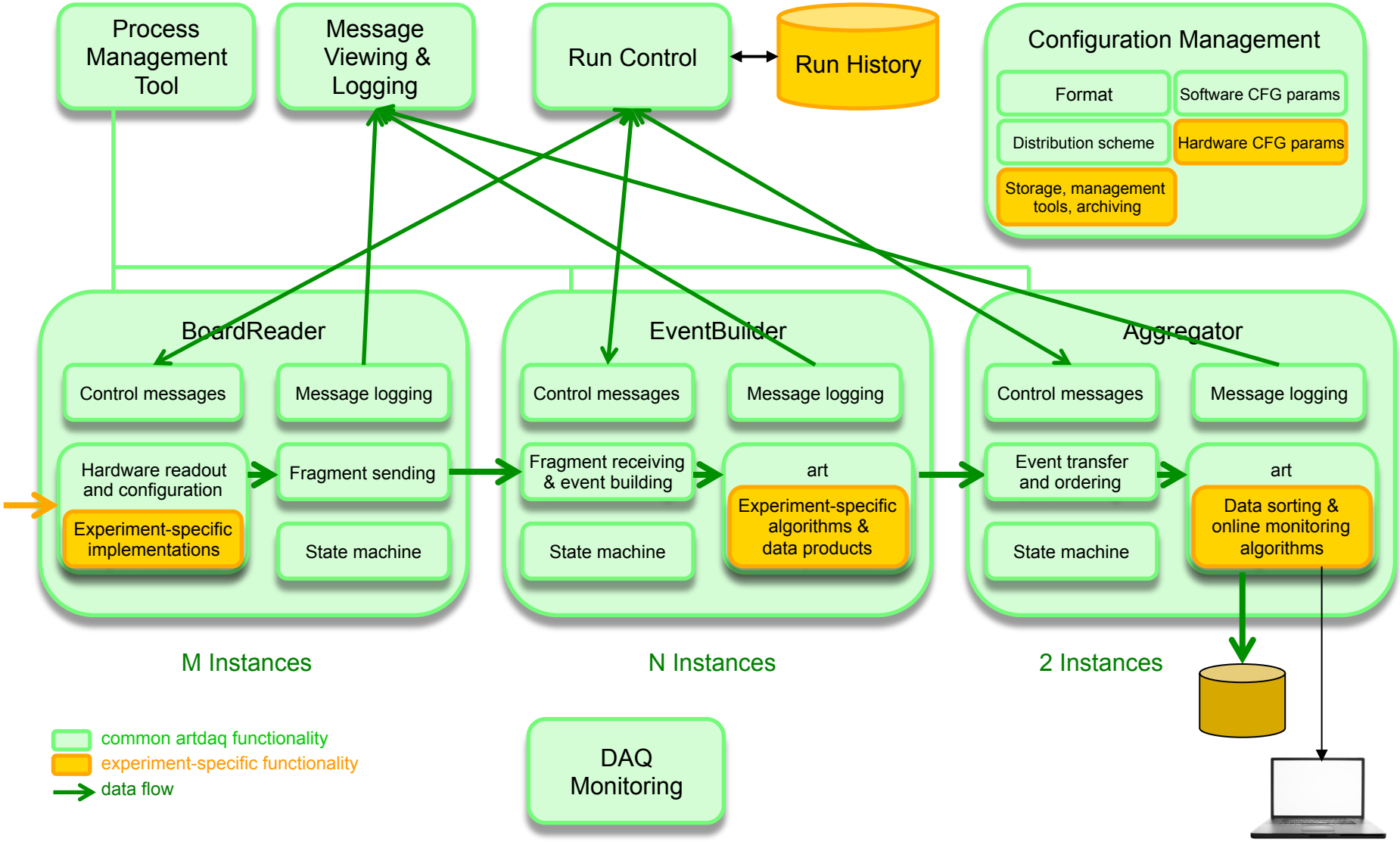
- We're working more with SLAM group on these as time goes on – this is going very well
- First instance of having centrally managed private nodes: Mu2e Pilot system. Details are still being worked out on how Puppet configurations are managed and software is updated
- Ideally, access to central Git repos (and other similar operations) from private-network nodes is straightforward

Linux distribution for OtS DAQ commercial hardware?

- Security concerns generally keep non-SLF nodes on private networks

Backup slides

artdaq Software Components & Functions



Current *artdaq* Users

DarkSide-50

- First production use of *artdaq*
- CAEN VME modules, commodity computers
- DAQ running reliably; stable operation

LBNE

- 35t prototype detector running mid-2015
- Vertical slice testing of HW and SW
- Strong physicist involvement on *artdaq* customizations
- We're developing the *artdaq* interface to Run Control and helping with configuration management

Mu2e

- Pilot system under development now
- Commercial PCIe cards, commodity computers
- 30 GB/sec, filtering factor of ~1000

LArIAT

- *artdaq* used on top of original DAQ code
- Data-taking resuming now

NOvA

- *art* for enhanced triggering (data-driven triggers)
- A few pieces of *artdaq* for *art* input

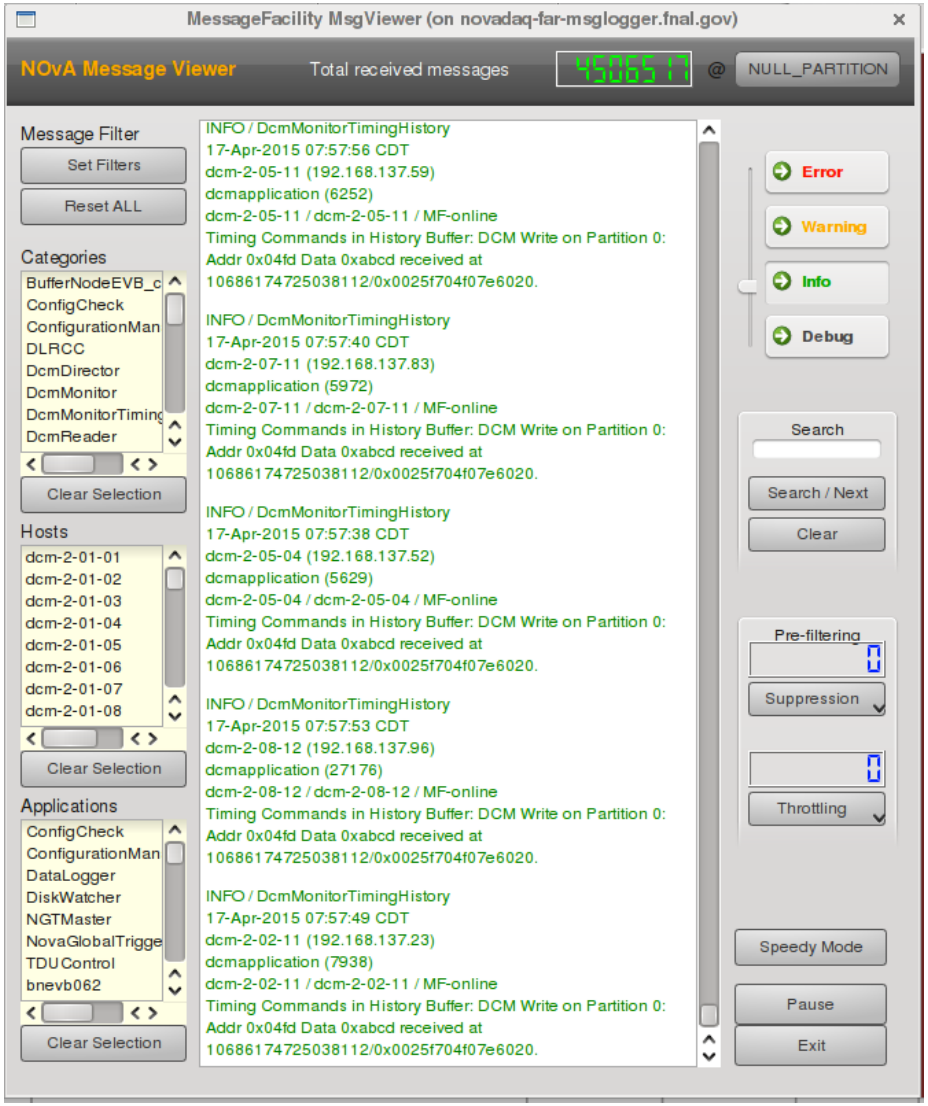
uBooNE

- Uses a number of *artdaq* utility classes

Centralized Message Viewing

MessageFacility package
- Added distributed transport
- Added reuse of the graphical Viewer from NOvA

Ready to be tested for DUNE/LBNE 35t



Web-based Control and Monitoring

Prototype web-based tools have been developed using a Node.js web server, Javascript in the browser, and third-party Javascript libraries. Other options are being explored.